

What is claimed is:

1. A hybrid compressor system for a refrigeration cycle system of a vehicle that includes an internal combustion engine and an electric power source, the hybrid compressor system comprising:

an electric motor that is rotated when the motor is energized by electric power supplied from the power source;

a compressor device that compresses refrigerant of the refrigeration cycle system and is connected to the engine and the motor to selectively receive drive force from one or both of the engine and the motor; and

a control apparatus that controls the motor, wherein when the engine is operated in an idling mode, the control apparatus energizes the motor to drive the compressor device alone or in cooperation with the engine and controls the energization of the motor to adjust load on the engine.

2. The hybrid compressor system according to claim 1, wherein:

the vehicle further includes an engine control unit, which controls the engine; and

when the compressor device is driven at the time of operating the engine in the idling mode, the control apparatus increases the electric power supplied to the motor to reduce the load on the engine and, at the same time, transmits a signal to the engine control unit to control fuel injection of the engine in a manner that reduces fuel consumption of the engine.

3. The hybrid compressor system according to claim 1, wherein the power source is a vehicle battery.

4. The hybrid compressor system according to claim 1, further comprising a connecting mechanism that is placed between the engine and the compressor device and selectively enables and disables conduction of drive force from the engine to the compressor device, wherein when the control apparatus controls the energization of the motor to adjust the load on the engine, the control apparatus also controls the connecting mechanism to control conduction of drive force from the engine to the compressor device.

5. The hybrid compressor system according to claim 4, wherein:
the vehicle further includes an engine control unit, which controls the engine; and

when the control apparatus controls the connecting mechanism to disable conduction of drive force from the engine to the compressor device and thereby to reduce the load on the engine, the control apparatus transmits a signal to the engine control unit to control fuel injection of the engine in a manner that reduces fuel consumption of the engine.

6. The hybrid compressor system according to claim 4, wherein:
when the motor drives the compressor device alone, the control apparatus controls the connecting mechanism to disable conduction of drive force from the engine to the compressor

device; and

when the motor drives the compressor device in cooperation with the engine, the control apparatus controls the connecting mechanism to enable conduction of drive force from the engine to the compressor device.

7. The hybrid compressor system according claim 1, wherein:
the vehicle is of a type that normally stops the engine when the vehicle is temporarily stopped; and

when the engine is operated in the idling mode in the temporarily stopped state of the vehicle due to an operational state of an auxiliary device driven by the engine or due to thermal load state of the refrigeration cycle system, the control apparatus energizes the motor.

8. The hybrid compressor system according to claim 7, further comprising a connecting mechanism that is placed between the engine and the compressor device and selectively enables and disables conduction of drive force from the engine to the compressor device, wherein when the engine is driven in the idling mode in the temporarily stopped state of the vehicle due to the operational state of the auxiliary device, the control apparatus controls the connecting mechanism to disable conduction of drive force from the engine to the compressor device.

9. The hybrid compressor system according to claim 7, further comprising a connecting mechanism that is placed between the

engine and the compressor device and selectively enables and disables conduction of drive force from the engine to the compressor device, wherein when the engine is driven in the idling mode in the temporarily stopped state of the vehicle due to the thermal load state of the refrigeration cycle system, the control apparatus controls the connecting mechanism to enable conduction of drive force from the engine to the compressor device.

10. The hybrid compressor system according to claim 1, further comprising a drive force distributing mechanism that distributes the drive force of the engine to the motor and the compressor device and conducts the drive force of the motor to the engine and the compressor device, wherein when the motor is energized, the drive force distributing mechanism conducts both the drive force of the motor and the drive force of the engine to the compressor device.

11. The hybrid compressor system according to claim 10, wherein the drive force distributing mechanism is a planetary gear arrangement.

12. The hybrid compressor system according to claim 1, wherein:
the motor includes a rotatable shaft;
the compressor device includes a rotatable shaft that is directly joined with the rotatable shaft of the motor; and
when the motor is energized, drive force exerted on the rotatable shaft of the motor is conducted to the rotatable shaft

of the compressor device.

13. The hybrid compressor system according to claim 7, wherein when the engine is operated in the idling mode, and the motor is energized, the control apparatus changes a rotational speed of the motor based on the thermal load state of the refrigeration cycle system.